DOCUMENT RESUME

ED 063 743 EM 009 903

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TITLE Beyond Bureaucracy--Message Diffusion As a Communication Audit Tool.
INSTITUTION Michigan State Univ., East Lansing. Dept. of Communication.
PUB DATE Apr 72
NOTE 21p.; Paper presented at the International Communication Association Annual Convention (Atlanta, Georgia, April 19-22, 1972)

EDRS PRICE MF-$0.65 HC-$3.29
DESCRIPTORS *Communication (Thought Transfer); *Diffusion; *Evaluation Methods; Evaluation Techniques; Information Dissemination; Information Theory; *Measurement Techniques; *Organization

ABSTRACT

Because it is becoming increasingly important for organizations to have efficient communications, we need to develop ways to describe links in communication nets and how these nets meet the needs of the organizations. In any approach to analyzing communication networks, the following concepts would appear to be important: the communication structure, the communication load, the rate of message flow, the amount of redundancy, the efficiency of the actual pathways of messages, the extent of message distortion, and the different pathways of messages according to their different functions. Five different approaches--the duty study, the use of observers, the cross-sectional interview, the "small world" technique, and the study of the diffusion of selected messages--each offer distinct advantages and disadvantages for measuring the different concepts in communication networks. It is only once we know how the organization is currently responding to its environment that we can make recommendations about how it might respond more effectively. Of the above approaches to analyzing the system, the message diffusion approach seems to be most suitable for collecting data relating to almost all of the concepts that are central to evaluation. (SH)

ED 063743

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BEYOND BUREAUCRACY -- MESSAGE DIFFUSION AS A COMMUNICATION AUDIT TOOL

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Atlanta, Georgia

April 19-22, 1972

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"Most organizations have a structure that was designed to solve problems that no longer exist." John Gardner (1963)

Alvin Toffler, in his best-seller Future Shock, presents a challenging glimpse of what the future may be like for "organization man" ... "his position will be constantly changing, fluid and varied. And his organizational ties, like his ties with things, places and people, will turn over at a frenetic and ever-accelerating pace." (1970, p. 125)

Both Gardner and Toffler emphasize some of the changes that we can already see in many organizations--away from strict bureaucratic relationships and formal top-down communication to less restricted, freer patterns of communication that fulfill immediate needs. More and more frequently, management will establish communication relationships on a unique and "once-only" basis.

There may have once been a time when 'a priori' decisions could be made on how to structure communication in organizations, but such opportunities are becoming increasingly rare. Instead, these trends call for frequent auditing or evaluation of existing communication patterns to assess the extent to which they meet the current needs of the organization as it interacts with its changing environment. If future developments in organizations follow Toffler's predictions, then it will become in-

creasingly important to ensure that the right information gets to the right persons at the right time, without getting lost in the "old" hierarchy, nor cluttering up the desks and minds of those who do NOT need to know. Our task and challenge as communication scientists and practitioners is thus to:

1. develop concepts that allow us to describe current communication patterns.
2. develop audit techniques that allow rapid and economical description of these patterns.
3. develop criterion measures that allow us to evaluate the degree to which the current patterns meet current needs in the organization.
4. develop ways of rapid and effective reporting on the "state of the system."

Perhaps the most central and crucial aspect of any communication audit is the description of who is linked into different communication nets, and how these nets meet the needs of the organization. In the present paper, we review and compare five different approaches to analyzing communication networks and message diffusion processes. We also describe some of the findings from an exploratory message diffusion study conducted in a Federal agency.

Just as different breeds of dogs have been selected for different purposes -- greyhounds for speed, dobermanns for guard duty and pomeranians for laps -- so different research techniques offer distinct advantages (and disadvantages) for measuring different concepts. In attempting to

measure or audit the message flow in a communication system, the following concepts would appear to be important:

1. the communication structure, or repetitive pattern of communication exchanges. This is frequently described as the communication network that links the members of the organization. As many observers have noted, this may or may not reflect the formalized organizational chart.
2. the communication load. Here we are interested in the amount of time and effort particular members of the organization spend in communicating and/or processing information. Both communication overload and underload may occur, depending on an individual's linkages into the communication networks.
3. the rates at which messages flow through the system. This is the time that messages take to diffuse through the system to critical points. This rate will be affected by the number of messages in the system and the speed with which they are processed and transmitted.
4. the amount of redundancy that is built into the system. We view redundancy in this situation as the receipt by an individual of essentially the same message through different channels or sources. As with load, there will be some optimum level of redundancy for satisfactory system performance.
5. the efficiency of the actual pathways that are followed by messages in their diffusion through the system. It is pos-

sible to compare the actual pathways with the formal organization chart or with theoretical pathways, as a way of assessing the efficiency of the patterns that have developed. This comparison can be made in terms of various system costs such as number of links, degree of redundancy, etc.

6. the extent to which the messages are distorted as they move through the system. Both leveling, sharpening and assimilation may occur to change the meaning or content of the messages.

7. the network or pathways that messages serving different functions follow. There are many different functional classifications that can be applied to messages, as noted by Farace & MacDonald (1971). We suggest the threefold classification proposed by Berlo (1970), that focuses upon the consequences of the message for the members of the system. These functions are --

production -- getting the job done

innovation -- exploring new alternatives

& maintenance -- keeping the system and its components operating.

Given these concepts, or measures of system performance, we propose to review a number of research techniques in terms of how well they are adapted to the measurement of these concepts and how costly they are to implement. Of the diversity of both obtrusive and unobtrusive research techniques that are available, five distinct approaches have been applied to auditing communication networks and message diffusion in organizations.

These approaches are:

1. The duty study -- using this approach, key respondents are furnished with a means of recording their communication behavior, and either continuously or periodically record the nature of their communication and the personnel with whom they interact.
2. the use of observers -- trained observers accompany key respondents and record their communication behavior. This is essentially similar to the duty study, but does not require the respondents to take responsibility for recording their interaction.
3. The cross-sectional interview or questionnaire -- perhaps the "standard" social science research technique, where all (or a sample) of members are asked to report their overall patterns of interaction. The emphasis here is on establishing general behavioral tendencies, from which specific message handling activities can be inferred.
4. the 'small world' technique -- this approach is based on following a message destined for a specified receiver, and tracing the steps that the message follows to reach this person.
5. the study of the diffusion of selected messages -- in contrast to the establishment of general patterns of message handling, the diffusion approach focuses on the actual pathways that a particular message follows in its diffusion through the organization. By following specific messages, this approach allows the measurement of the effects of the system on the message itself.

(a) the duty study:

The duty study has been used by several researchers, including Burns

(1954), Hinrichs (1964), Farace and Morris (1969) and others, as a technique for eliciting information on the communication activities of either a random sample, or (more commonly), of purposively selected key individuals. The technique requires respondents to record their communication activities, either throughout the day or at fixed or random times as indicated by a device that they carry. For example, randomly initiated time frames can be established by using a device which randomly emits an audible tone, Martin (1967).

The duty study can potentially provide very detailed information about the communication load that these individuals carry, and the communication network that they are linked into. It can also be used to determine the relative amount of time the respondents spend on communication that serves different functions. However, because of the demands of the respondent's time and the mass of "raw" data that is generated in an audit of this kind, it is impractical as a way to determine the overall network or communication structure. Similarly, this method is not particularly suited to assessing message distortion, to defining actual message pathways, the rates of message flow, or the redundancy of the network.

The duty study also demands a high degree of respondent cooperation and involvement over a considerable period of time. The technique is thus very costly to the system and only offers precise data about limited numbers of individuals in most cases. Also, as noted by Farace and Morris (op cit), the fact that the respondent is continually aware of this recording activity may make him (and his contacts as well) deviate from normal patterns of interaction and behavior.

The chief advantages of this technique lie in the avoidance of observer bias, and in the avoidance of reliance on memory about communication contacts. It would thus appear particularly appropriate for getting at the communication load carried by key personnel -- but not particularly suited to measuring the other concepts.

(b) observers:

The use of participant (or non-participant) observers has been a traditional technique for obtaining data on organizational communication. As noted by Davis (1953-b), such observation was used in the Hawthorne studies of Roethlisberger & Dickson (1946). With this technique, trained observers generally sit with or follow the particular respondents and record their communication behavior.

Like the duty study, this technique suffers from a major risk of affecting and changing the interaction from its "normal" pattern. Similarly, its greatest use is in describing the communication behaviors of a relatively limited number of key respondents in great detail. Through the careful training of coders and their continuous monitoring of respondents, the technique is well suited to the measurement of the communication load of key personnel. To a lesser degree, this approach could also be used to describe the immediate contacts, or communication environment, of these individuals and their information processing behaviors. Similarly, the observer may be able to infer the functions that the communication appears to serve.

However, this approach suffers from being extremely costly in terms of the time required by skilled personnel in data collection. Due to

its focus on only certain key personnel, the use of observers is also essentially unsuited to the measurement of rates of flow, distortion, and efficiency.

(c) the cross-sectional survey:

The cross-sectional survey has been the major research technique for social scientists for obtaining data about a wide range of concepts, including studies of communication networks and message diffusion. The technique requires interviewing all (or a sample) of the study population about their overall communication patterns. Jacobson & Seashore (1951) reported one of the classical studies of communication structure in an organization in a study based on this approach. Schwartz (1968), MacDonald (1970) and others have also used this basic approach. Typically, respondents are asked to identify the persons whom they talk with, about various functions, and with what importance, etc. From these data, the communication networks are then mapped out, using hand or computer-based techniques.

As a result of this approach, the cross-sectional study is particularly suited to the description of stable and enduring networks as they operate 'on the average'. The technique allows the identification of crucial communicators, of the incumbents of key roles (such as liaisons and bridges), and also permits gross measurement of load and redundancy.

While being well suited to the description of general patterns of communication, however, an approach that is based on general perceptions and extended recall is not a very precise instrument for getting at the efficiency or redundancy of pathways for particular messages.

Also, due to the problems of extended recall, the survey is not well suited for measuring distortion and rates of flow. As noted by Farace & Morris (op cit), direct interviewing is best suited to the measurement of highly salient or important aspects of a respondent's communication, but not to the recall of detailed aspects of his interaction.

(d) the "small world" approach:

The "small world" studies conducted by Milgram (1969), Shotland (1969) and others, have focused on the linkages that respondents choose when asked to transmit a message to a specified (unknown) person, using only those intermediaries they know personally. The technique has many similarities to the chain letters that wax and wane in popularity as a rapid way to fortune. The essential feature of this approach is that it describes potential networks, which are not necessarily those that are usually (or even ever) in use.

In the "small world" studies, each person in the chain only passes the message on to one person, hence this approach clearly excludes any measurement of redundancy. Similarly, because only one route taken by one message is documented, it is not suited to descriptions of communication load, nor the actual networks that would normally be activated.

However, relatively minor change to the standard technique through asking each person in the chain to encode the message themselves, would allow some assessment of distortion. While primarily focusing on the number of links, and therefore, efficiency, the technique would also offer a way to distinguish the networks developed for different types of communication.

A major drawback to this approach is its high degree of artificiality. It is based on an introduced message and a relatively unreal task -- only forwarding the message via persons who are personally known to an unfamiliar target. Therefore, it is unlikely to reflect the actual communication patterns that would occur in the day-to-day activities of most organizations, except in the activity of the "grapevine." Where a researcher wants to focus on the operation of the informal communication network, or grapevine, then this approach may offer considerable possibilities.

(e) the message diffusion approach:

A major research thrust by social scientists with diverse backgrounds has been the study of news diffusion, the diffusion of innovations, and the flow of influence. Deutschmann & Danielson (1963) is a classical study of news diffusion, Rogers & Shoemaker (1971) present a major synthesis of the diffusion of innovations, and the classical study of influence was the Erie county study by Lazarsfeld, Berelson & Gaudet (1948). The major thrusts of this vast body of research are summarizied by Tannenbaum & Greenberg (1968) and by Rogers & Shoemaker (1971). Essentially in all of this research the focus has been on the diffusion of one message (or innovation) through some specified social system. In general the diffusion of innovations research has been characterized by a heavy dependence on long term recall, while the social influence and news diffusion studies have focused on recent, high salience messages.

Davis (1953 a & b) was one of the first persons to advocate this type of approach to the study of organizational communication. His approach,

described as ECCO analysis (episodic communication channels in organization), incorporates the essential characteristic of focusing on a given message and tracing its diffusion through the organization. This is in contrast to the majority of other approaches that take the individual as the unit of study and note how he handles many messages, or elicit his perceptions of his general information handling behavior. By following one message in its diffusion through the organization, this approach is particularly suited to measuring rates of flow, distortion of messages, redundancy, efficiency of the activated linkages, the patterns of diffusion for messages seen as serving different functions, and to a lesser degree, the elucidation of the structure or network.

As Davis (1953-b) notes, this approach offers the major advantage of dealing with actual concrete messages rather than gathering information about general perceptions or predispositions. Also, there are major advantages that accrue from being able to build up a temporal sequence of the actual flow of the message. Finally, by collecting data immediately after the message has diffused, this approach does not suffer from the disadvantages of contamination, reactivity or long term recall that are inherent in some of the other approaches.

The disadvantages of the approach relate primarily to the apparent need to make a complete census of the study population in order to complete the description of the diffusion. Another problem is one that confronts all diffusion research (see the discussion by Rogers & Shoemaker (op cit, p. 77)) -- the time dimension. The complete diffusion of any given message (or innovation) may take a very long period of time,

and thus the securing of a complete diffusion pattern must be weighed against the rapid loss of recall for many messages as the collection of data is delayed. Also in common with the "small world" approach, each message describes a unique diffusion pattern that may or may not approximate a somewhat stable and generalized communication network. Finally, this approach also introduces the problem of having to select a research vehicle (message) on short notice in order to follow its diffusion. This short period for data collection will be particularly acute if more routine and less salient messages are selected.

Despite these problems, Table 1 indicates that this approach does appear to be particularly well suited to the collection of data relating to the concepts or measures that were noted earlier in the paper. Given the predicted transitory nature of many future work groups, it may frequently be unnecessary to census the whole organization. Instead, the research can concentrate on whether newly organized groups have active linkages to crucial information sources, and whether these linkages are of the desired degree of efficiency, and so on. Similarly, by using such techniques as group interviewing or telephone interviews, it may be possible to collect the data very rapidly and with a minimum of contamination. The major advantages of this approach -- the following of "real" messages and the description of the current pattern, not a prior generalized pattern -- clearly fit into our stated need of determining whether the right information is getting to the right people at the right time.

Further development of this approach will hopefully answer some of the methodological questions that do not appear to have definite answers at this time. We see some of these as:

Table 1. The suitability of differing research techniques to the measurement of selected indicators of system performance

Research technique	System performance measures						
	Structure	Load	Rates of flow	Distortion	Redundancy	Efficiency	Functions
Duty study	0	2	0	0	1	0	1
Observers	1	2	0	0	1	0	1
Cross-section	2	1	0	0	1	1	2
"Small world"	1	0	1	1	0	2	1
Diffusion	1	1	2	2	2	2	2

2 = Very suitable technique

1 = Moderately suitable technique

0 = Basically unsuitable technique

(i) how stable are the patterns of message diffusion within a particular system or subsystem -- how many messages have to be traced in order to obtain a "true" picture of the network?

(ii) how frequently will these patterns change, and what factors will encourage or suppress these changes?

(iii) how can data be obtained with a minimum of delay, without contamination of the subsequent continued diffusion of the message?

Given that this method only requires a simple and short questionnaire or interview, Davis (1953-b) notes that it has significant advantages of being relatively low cost, having a short response period, being simple to administer and respond to, and being adaptable to many different situations. We would add the advantage that this approach has of being tied into the vast diffusion literature, which offers a number of key propositions and generalizations that relate to temporal and spatial message flow. We see the continued development of the message diffusion approach as being currently one of the most promising approaches to a communication audit.

A modification of Davis's basic approach was used recently as part of a study of a Federal Agency. As a result of this experience, the following findings may provide some helpful guidelines for those who might be considering using this technique in conducting a communication audit.

In an effort to describe how a sample of the ongoing flow of messages became part of the 'pool of knowledge' within the Agency, we focused our attention and hence the research instrument, on five major questions:

(i) what were the levels of awareness of the messages (both structure and efficiency of the networks)

(ii) through what channels did the messages reach various members (redundancy)

(iii) how rapidly did they learn of the messages (rates of flow)

(iv) which of the specific details incorporated in the messages were recalled (distortion)

(v) what functions were the messages seen to serve (functions)

Given these aims, we selected messages on the basis of the following criteria:

* they carried information intended for most, if not all, members of the Agency.

* the messages had originated within three or four weeks prior to our data gathering.

* the messages reflected a range of importance and intended functions, as defined by Agency officials responsible for their release.

A total of 470 agency personnel were asked to complete five questionnaires, each one dealing with a separate message. This provided us with 2350 message units. The questionnaires only provided a general message title and we sought details of when, where and from whom the respondents had heard the message, what details they recalled, whether they learned of it face-to-face or through another channel, the functions that they felt it served, and to whom they passed it on. The questionnaires were completed in group interview sessions to minimize contamination between respondents and to combine the benefits of standardized procedures with those of self-reporting by the respondents.

We found that at least one-third ... and as many as two-thirds ... of the staff did not know about the messages within several weeks of their initial introduction into the ongoing message flow among the Agency personnel. While there is no reason why all personnel should be aware of all of these messages, this indicated that a significant number of persons were not receiving information that was identified as being of general concern.

Four in ten of the staff who knew of the messages learned about them from direct fact-to-face contact, while another three out of ten learned from memoranda; the telephone accounted for only six percent; the remaining 25 percent reported a combination of channels or no response. Despite considerable variation between the individual messages,[1] the findings suggested that the staff of this agency spent a considerable amount of time discussing current messages, with memoranda in most cases only supplementing or enhancing a normally high level of personal discussion.

Although each of the messages had several details incorporated into it, in general only about a third of the staff were aware of any given detail, and of all the details, only four were recalled by half or more of the respondents. While many details were lost,[2] virtually no erroneous details were added to the messages. The only major souce of error was confusion with similar messages within the organization.

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1. Twelve different messages were considered, five in each of three branches of the agency -- three messages were duplicated in two of these branches.

2. Unlike Davis, we only provided a general message title, therefore we were able to measure the amount of distortion and the relative salience of the details.

Most of the messages were seen as serving multiple functions -- both relating to production (getting the job done) and maintenance, or production and innovation (new ideas).

Finally, as well as obtaining these general measures of communication structure, we were able to consider specific individuals and groups of individuals and determine whether or not they received the information, and by what time. Also, by plotting out the diffusion networks, we were able to compare these to the formal organization chart and to more generalized networks based on a cross-sectional study undertaken at the same time. Although we were confronted with only incomplete networks, due to respondents failing to recall the source of their information, this development was seen to potentially provide one of the richest outputs of such diffusion studies. In general we found that the patterns of message diffusion followed the "cluster chain" type of network, as described by Davis (1953-a).

As this was an exploratory study, a census of these branches of the Agency was conducted, and relatively general messages were selected. If the audit was designed to assess the effectiveness of the communication structure of the communication network for specific individuals or groups, then a much simpler study could have been made, only involving certain key parts of the organization and perhaps particular types of messages.

We see applications of a message diffusion audit as being a simple and effective way of collecting information on which to base recommendations on the communication systems that will be needed to meet the organizaitonal changes that are facing us and that will continue to change at an accelerating rate.

One related issue that this paper does not confront is the need to establish standards or goals to measure levels of system performance against. It would appear very difficult to set "absolute" standards; however as more and more studies are undertaken we may be able to set comparative standards. Currently, it would seem that we must fall back on management-defined goals, and/or some assessment of the costs and returns that might be expected from any changes.

Regardless of the standards that are used to assess system performance, it is only once we know how the organization is currently responding to its environment that we can make recommendations about how it might respond more effectively. While observation, duty studies, and other techniques offer alternatives for collecting some types of data, the message diffusion approach seems to offer particularly exciting prospects. This approach offers advantages in terms of non-reactivity, ease of application and versatility. Through its suitability for collecting data relating to almost all of the concepts or aspects that appear central to any evaluation of the effectiveness of organizational communication systems, we suggest that this "tool" is a must in the practitioner's "bag of skills."

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